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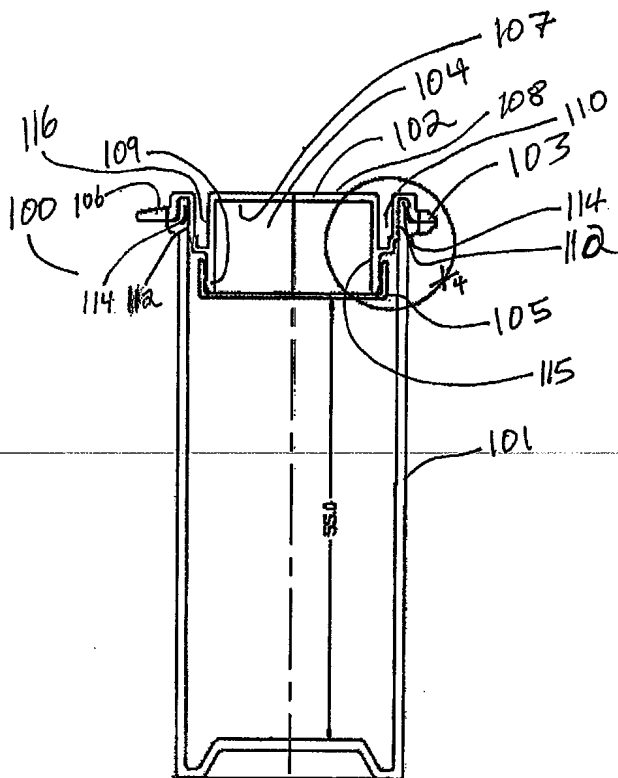
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(54) Title: **FLIP TOP CONTAINER WITH BUILT IN DESICCANT**



(57) Abstract: The present invention relates to a package that includes a container and flip-top cap with a built-in component for a desiccant. The invention particularly relates to packages for moisture sensitive materials, particularly pharmaceutical substances. The package includes a container (101), a flip-top cap (102), a hinge (103) joining the container and the cap, and a sieve (105). The flip-top cap has an inner side (107), an outer side (108), and a wall (109) extending from the inner side. The inner side and the wall define a compartment (104). The sieve includes a perforated top (123) and a wall (124) extending from the perforated top, the sieve being configured to be mounted to the wall (109) extending from the inner side to retain at least a desiccant material in the compartment.

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FLIP TOP CONTAINER WITH A BUILT IN DESICCANT

Field of the Invention

The present invention relates to a package that includes a body and flip-top cap with a built-in component for a desiccant. The invention particularly relates to packages
5 for moisture sensitive materials, particularly pharmaceutical substances.

Background of the Invention

The containment of a product is a fundamental function of packaging for medicinal products, as well as food products. The design of high-quality packaging must take into account both the needs of the products and of the manufacturing and distribution system.
10 Apart from being strong, inert, and leak-proof, the packaging must provide protection of the product against all adverse external variables that may affect a products quality or potency. These variables include light, moisture, oxygen, biological contamination and mechanical damage.

There are a number of products that are preferably stored in an environment that is
15 moisture free for sustained periods. Moisture absorption by the product may result in stability problems, as well as loss of potency. In some cases, interaction with moisture may lead to substantial changes in physical and structural properties of a product which may adversely affect the product. Therefore, it is desirable that these types of moisture-sensitive products be stored in moisture-proof packaging.

20 Moisture control during the initial placement of substances into sealed, moisture-free containers is usually manageable. The container should be selected so that it has a low permeability to moisture; such a selection also is usually manageable. As a result, the product is protected from moisture until it reaches the end user. Once the consumer receives the product, the container is repeatedly opened and closed to access the product.
25 Each time the container is opened moisture will be introduced into the container. Unless this moisture is removed from the container, it may be detrimentally absorbed by the product. For this reason, it is a well known practice to include a desiccating unit together with the product in the container. For example, a small sachet, bag or pouch may contain the desiccating material and be placed into the container. Problems may arise when the

desiccant is loose and comes in direct contact with the product; is unknowingly ingested by the consumer or is accidentally thrown away or otherwise lost.

U.S. Patent No. 5,114,003 discloses a container in which the desiccant canister is secured to the inside at the base of the container and the desiccant canister is punctured immediately prior to use. Sud-Chemie Performance packaging markets desiccant filled plastic inserts that can be easily placed into screw or bottle container caps.

Desiccants have also been integrated into product packaging. Capital Specialty Plastics has developed vials and containers having desiccant linings that are airtight and leak proof. Sanner provides closures equipped with highly active adsorbents for moisture protection, as well as spaces for protection from damage during transportation.

Although these containers and closures ensure that the desiccant remains in the package for the entire shelf life and eliminates the potential for accidental consumption by the user, every time the package is opened, the closure device or cap with the desiccant must be held separately until the product is taken out from the container. This may lead to the cap being misplaced. Further, excessive moisture is let in upon opening the package and a smaller amount of desiccant will not be sufficient for a sustained period of storage.

Another requirement of a package is that it should be user-friendly for patients. These requirements have been fulfilled by flip-top or hinged closures.

U.S. Patent No. 5,348,201 and U.S. Patent No. 5,417,350 disclose flip top closure devices for a dispensing opening of a container. The closure devices have a first body member with a flip top adapted to be mounted on the container and a second body member mounted on the first body member.

U.S. Patent No. 5,992,659 discloses a tamper evident flip top pouring closure for use with a container having a neck with an opening. The neck also has an outer surface with a screw thread and interlocking means thereon.

The inventors have now designed an improved package for moisture-sensitive products, that includes a flip-top cap with a built in desiccant.

Summary of the Invention

In one general aspect there is provided a package for containing materials that require a substantially moisture-free environment. The package includes a container, a flip-top cap, a hinge joining the container and the cap, and a sieve. The flip-top cap has an inner side, an outer side, and a wall extending from the inner side. The inner side and the wall define a compartment. The sieve includes a perforated top and a wall extending from the perforated top, the sieve being configured to be mounted to the wall extending from the inner side to retain at least a desiccant material in the compartment.

Embodiments of the package may include one or more of the following features.

For example, the hinge may be integral with the container and the cap. Alternatively, the hinge may not be integral with either or both of the container and the cap. The cap may be press-fitted into an opening of the container to provide an air-tight environment. The sieve may be snap-fitted on the wall extending from the inner side. The hinge may be integral with the container and the cap.

The package may further include an extending member on the cap, the extending member extending from the cap such that the extending member can function as a lever to open the cap. The package may further include at least one desiccant within the compartment. The desiccant may be one or more of montmorillonite clay, silica gel, molecular sieve, calcium oxide, calcium sulphate and calcium chloride.

The sieve may be a high density polyethylene. The container may be made of one or more of polyolefins and elastomers. The container and cap may be manufactured by injection molding. The container may have a differential wall thickness across the cross-section.

The wall extending from the inner side of the cap may include at least one detent.

The sieve includes the perforated top, the wall extending from the perforated top, and may include at least one detent extending from the wall. Mounting the sieve to the cap includes forming an interference fit between the detents and the opposite walls.

The package may further include tamper-evident packaging. The tamper-evident packaging may be heat shrink wrappers and film wrappers.

In another general aspect there is provided a process of making a package for containing materials that require a substantially moisture-free environment. The process includes forming a container; forming a flip-top cap having an inner side, an outer side, and a wall extending from the inner side, the inner side and the wall defining a
5 compartment; forming a hinge joining the container and the cap; and forming a sieve comprising a perforated top and a wall extending from the top. The sieve is configured to be mounted to the wall extending from the inner side to retain at least a desiccant material in the compartment.

Embodiments of the process may include one or more of the following features or
10 those described above. For example, the wall extending from the inner side of the cap may include at least one detent, the sieve includes the perforated top, the wall extending from the perforated top, and may include at least one detent extending from the wall, and mounting the sieve to the cap may include forming an interference fit between the detents and the opposite walls.

15 One or more of the container, the hinge, the cap, and the sieve may be formed by injection molding. The hinge may be formed integrally with the container and the cap. The hinge may not be formed integrally with one or both of the container and the cap.

The features and advantages of the present invention will become apparent from the discussion below of specific, illustrative embodiments thereof presented in conjunction
20 with the accompanying drawings.

Brief Description of the Drawings

Fig. 1a is a side view of one embodiment of a package having a flip top lid in an opened position.

Fig. 1b is a top view of the package of Fig. 1a.

25 Fig. 2 is a top plan view of another embodiment of a package having a flip top lid in a closed position.

Fig. 3 is a cross-sectional side view of the package of Fig. 2 in a closed position.

Fig. 4 is an enlarged sectional view of the hinge connecting the container with the cap and locking of the cap onto the body of the container in a closed position.

Fig. 5 is a top plan view of the package of Fig. 2 in an opened position.

5 Figs. 6a and 6b are sectional side views and top plan views, respectively of the plastic sieve that retains the desiccant within the compartment of the cap.

Fig. 7 is a longitudinal sectional view of the package of Fig. 2 in an opened position.

Detailed Description of the Invention

The inventors have generally developed a package for containing materials that
10 require a substantially moisture-free or reduced moisture environment. The package includes a container, a flip-top cap, a hinge joining the cap to the container, and a sieve. The container may be a bottle, cylinder, or other article that functions to hold, for example, pharmaceutical dosage forms. The flip-top cap has an inner side, an outer side, and a wall extending from the inner side. The inner side and the wall define a compartment. The
15 hinge joins the container and the cap. The sieve is configured to be mounted to the wall extending from the inner side to retain a desiccant material in the compartment.

Referring to Figs. 1-7, embodiments of a package 10 include a container 1 which may be of a cylindrical type having a closed bottom with a lid or cap 2 integrally formed with the body of the container. As illustrated in Figs. 1a and 1b, the container 1 and the
20 lid or cap 2 are affixed together or attached to each other by a hinge 3. Although hinge 3 is shown as being integrally formed with the container 1 and cap 2, the hinge 3 can be formed such that it can be mounted to the container in a manner that makes the cap difficult to lose. For example, the container can have an outer circumferential groove that receives a ring that is integral with the cap. Because the ring is received in the groove, it
25 will be difficult to remove from the container thereby keeping the opened cap with the container.

The lid or cap 2 has a built in compartment 4 for housing a desiccant on its inner side 7. A suitable desiccant material is enclosed within the compartment 4 with the help of a plastic sieve 5 (sieve openings not shown in Fig. 1b) which is snap-fitted on the

circumferential lip(s) or wall 9 that extends from the inner side 7 of the desiccant compartment. The compartment 4 is defined at least in part by the lip or wall 9 and the inner side 7. The lip or wall 9 may have multiple configurations (e.g., curved, straight edged, a step shape, interrupted, etc.) so long as the lip functions to retain the compartment 4 to the cap 2. The compartment may be retained by an interference fit, a threaded means, etc. as are known to those of ordinary skill in the art. The cap 2 has an outer side 8 and an extended portion 6, which acts as a lever in opening the cap.

Referring to Figs. 2-7, a second embodiment of a package 100 includes a container 101, a lid or cap 102, and a hinge 103 that joins the lid to the container. The lid 102 includes a compartment 104 that receives a desiccant material, a sieve cap 105 mounted to a circumferential lip or wall 109 to retain the desiccant material within the compartment 104, and an extended portion 106 which acts as a lever in opening the lid. The lid 102 also has an inner side 107 and an outer side 108. The inner side 107 is adjacent to the desiccant. The compartment 104, which receives the desiccant, is defined by the circumferential lip or wall 109 and the inner side 107. The wall 109 includes an inner surface 115 and an outer surface 116. The lid also includes an optional circumferential channel 110 having an outer edge 112 that mates with a circumferential lip 114 of the container 101. The channel 110 can be replaced by, for example, merely extending the outer surface 116 of the cap such that it contacts the lip 114 and forms a seal. The seal formed between the lip 114 and the outer edge 112 serves as a barrier to moisture entry.

As evident in Fig. 4, the container 101 also includes a circumferential lip 118 that extends outwardly from the container and serves as a stop to the lip 102 when the lid is closed against the container. The sieve 105 mates with the circumferential lip 109 of the compartment 104 using any means that ensure that the sieve is retained against the circumferential lip and compartment. For example, Fig. 4 illustrates the use of a pair of detents 120 and 122 that extend inwardly from the sieve 105 and outwardly from the compartment 104, respectively. In particular, detent 122 extends from the outer surface 116 of the wall 109. When the sieve 105 is pressed against the compartment 104 and lip 109, force is required to pass the detents by each other. In so doing, however, the sieve will be securely retained against the lip 109, thereby keeping the desiccant within the lid. Although shown with the sieve fitting over the wall 109 and outer surface 116, the sieve can be configured to fit within the compartment 104 against the inner surface 115. The

detents then would extend inwardly from the wall 109 and outwardly from the sieve. The sieve 105 includes a perforated plate 123 from which the circumferential wall 124 extends. When the sieve 105 is mounted to the compartment 104, the circumferential wall 124 generally overlaps the lip or wall 109, thereby providing additional protection from moisture.

The container body is constructed from a substantially moisture impermeable, polyolefin material. While it is contemplated that any polyolefin may be utilized, polypropylene is particularly useful for the construction of the container and cap. Polypropylene is desirable because of its durability, rigidity, flexural resistance and impact resistance after being molded into the form of a container. Particularly, the container and cap are manufactured by injection molding suitable combination of polyolefins and elastomers. Suitable polyolefins include one or more of polyethylene and polypropylene. Suitable elastomers include one or more of polyisoprene, polybutadiene, polyisobutylene, polyurethanes and copolymers, such as poly (styrene-butadiene styrene), ethylene methacrylate copolymer and ethylene vinyl acetate copolymer.

Suitable desiccant materials include one or more of montmorillonite clay, silica gel, molecular sieve, calcium oxide, calcium sulphate and calcium chloride. The choice of desiccant material is not critical to the invention. The amount of desiccant is determined by the needs of the user.

The sieve on the desiccant compartment may be constructed using any thermoplastic. Particularly, it can be prepared from high density polyethylene (HDPE). HDPE is a high density version of polyethylene. It is harder, stronger and has better chemical resistance than low density polyethylene.

The container and cap may be manufactured by, for example, the process of injection molding. In this process, plastic parts are molded by using heat and pressure during the injection of a molten plastic polymer into a desired mold.

The package is designed with a differential wall thickness across the cross-section of the container body which enables it to achieve the requisite air-tightness while keeping the pack easy to open.

It is a desirable option to design the package to be a secure package. For example, a secure pack is one that has an indicator or barrier to entry, which, if breached or missing can reasonably be expected to provide visible evidence to the consumer that tampering has occurred. While nonetheless desirable, this type of packaging is an option and the
5 inventions described herein can be applied to products that do not have a tamper-evident packaging.

Tamper-evident packaging can be provided using heat shrink wrappers, film wrappers, sealed tubes, etc. Shrink sleeving is the most widely used due to its ease of use. It involves simply placing the shrink sleeve over the component and applying heat. The
10 sleeve shrinks and encapsulates the component. It also provides good insulation, chemical resistance, toughness and excellent colourability. The shrink sleeves may be prepared from one or more of polyethylene, polypropylene, polyvinylchloride, polystyrene or polyester.

Air-tightness in the pack is ascertained by vacuum-leakage test method using a
15 desiccator fitted with a vacuum pump. The packs are tested at 15 inch of mercury pressure for 2 minutes. Packs in which no water enters is termed air-tight.

While several particular forms of the invention have been described, it will be apparent that various modifications and combinations of the invention detailed in the text can be made without departing from the spirit and scope of the invention. Accordingly, it
20 is not intended that the invention be limited, except as by the appended claims.

We claim:

- 1 1. A package for containing materials that require a substantially moisture-free
2 environment, the package comprising:
3 a container;
4 a flip-top cap having an inner side, an outer side, and a wall extending from
5 the inner side, the inner side and the wall defining a compartment;
6 a hinge joining the container and the cap; and
7 a sieve comprising a perforated top and a wall extending from the
8 perforated top, the sieve being configured to be mounted to the wall extending
9 from the inner side and to retain at least a desiccant in the compartment.
- 1 2. The package of claim 1, wherein the hinge is integral with the container and the
2 cap.
- 1 3. The package of claim 1, wherein the cap is press-fitted into an opening of the
2 container to provide an air-tight environment.
- 1 4. The package of claim 1, further comprising an extending member on the cap, the
2 extending member extending from the cap, whereby the extending member can
3 function as a lever to open the cap.
- 1 5. The package of claim 1, wherein the container portion is comprised of one or more
2 of polyolefins and elastomers.
- 1 6. The package of claim 1, further comprising at least one desiccant within the
2 compartment.
- 1 7. The package of claim 6, wherein the desiccant comprises one or more of
2 montmorillonite clay, silica gel, molecular sieve, calcium oxide, calcium sulphate
3 and calcium chloride.
- 1 8. The package of claim 1, wherein the sieve comprises high density polyethylene.
- 1 9. The package of claim 1, wherein the sieve is snap-fitted on the wall extending from
2 the inner side.

- 1 10. The package of claim 1, wherein the container and cap are manufactured by
2 injection molding.
- 1 11. The package of claim 1, wherein the container has a differential wall thickness
2 across the cross-section.
- 1 12. The package of claim 1, wherein:
2 the wall extending from the inner side of the cap includes at least one
3 detent,
4 the sieve includes the perforated top, the wall extending from the perforated
5 top, and at least one detent extending from the wall, and
6 mounting the sieve to the cap comprises forming an interference fit
7 between the detents and the opposite walls.
- 1 13. The package of claim 1, further comprising tamper-evident packaging.
- 1 14. The package of claim 13, wherein the tamper-evident packaging comprises heat
2 shrink wrappers and film wrappers.
- 1 15. The package of claim 1, wherein the hinge is not integral with either or both of the
2 container and the cap.
- 1 16. A process of making a package for containing materials that require a substantially
2 moisture-free environment, the process comprising:
3 forming a container;
4 forming a flip-top cap having an inner side, an outer side, and a wall
5 extending from the inner side, the inner side and the wall defining a compartment;
6 forming a hinge joining the container and the cap; and
7 forming a sieve comprising a perforated top and a wall extending from the
8 top, the sieve being configured to be mounted to the wall extending from the inner
9 side to retain at least a desiccant in the compartment.
- 1 17. The process of claim 16, wherein:
2 the wall extending from the inner side of the cap includes at least one
3 detent,
4 the sieve includes the perforated top, the wall extending from the perforated
5 top, and at least one detent extending from the wall, and

- 6 mounting the sieve to the cap comprises forming an interference fit
7 between the detents and the opposite walls.
- 1 18. The process of claim 16, wherein one or more of the container, the hinge, the cap,
2 and the sieve are formed by injection molding.
- 1 19. The process of claim 16, wherein the hinge is formed integrally with the container
2 and the cap.
- 1 20. The process of claim 16, wherein the hinge is not formed integrally with one or
2 both of the container and the cap.

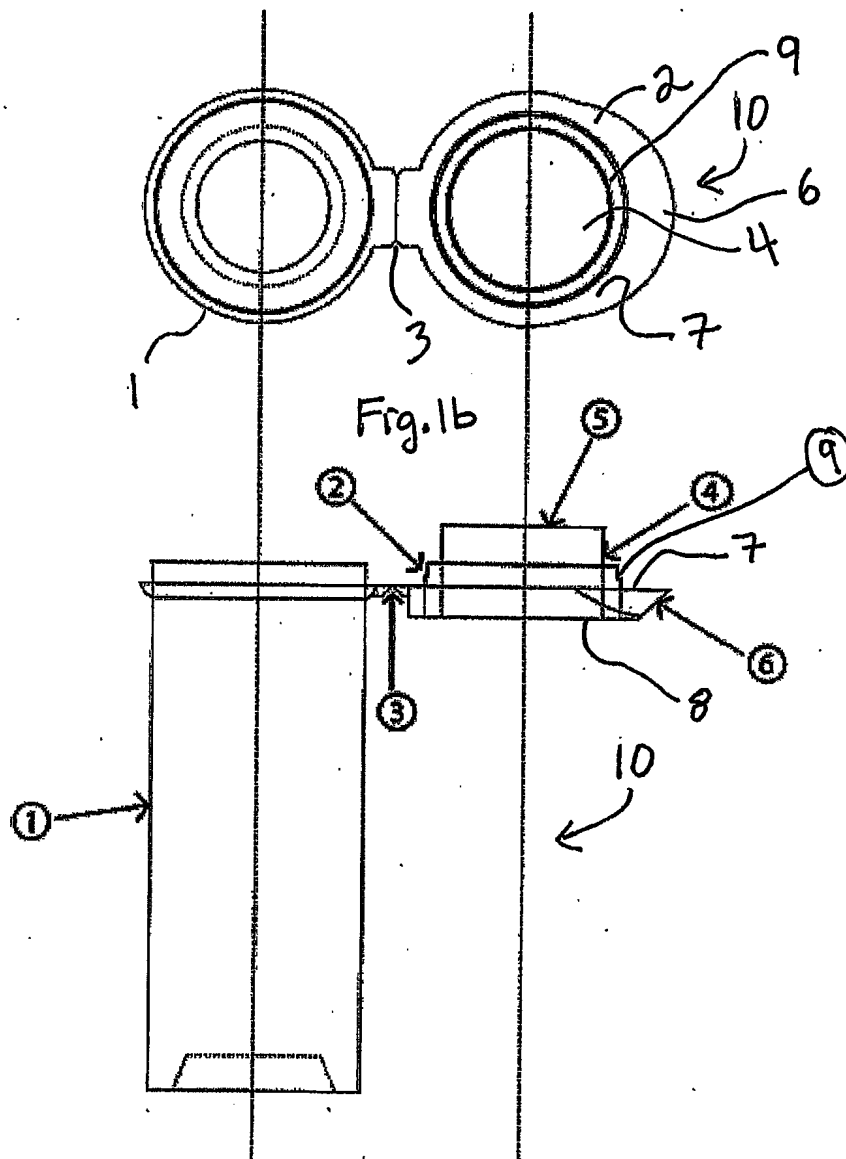


Fig. 1a

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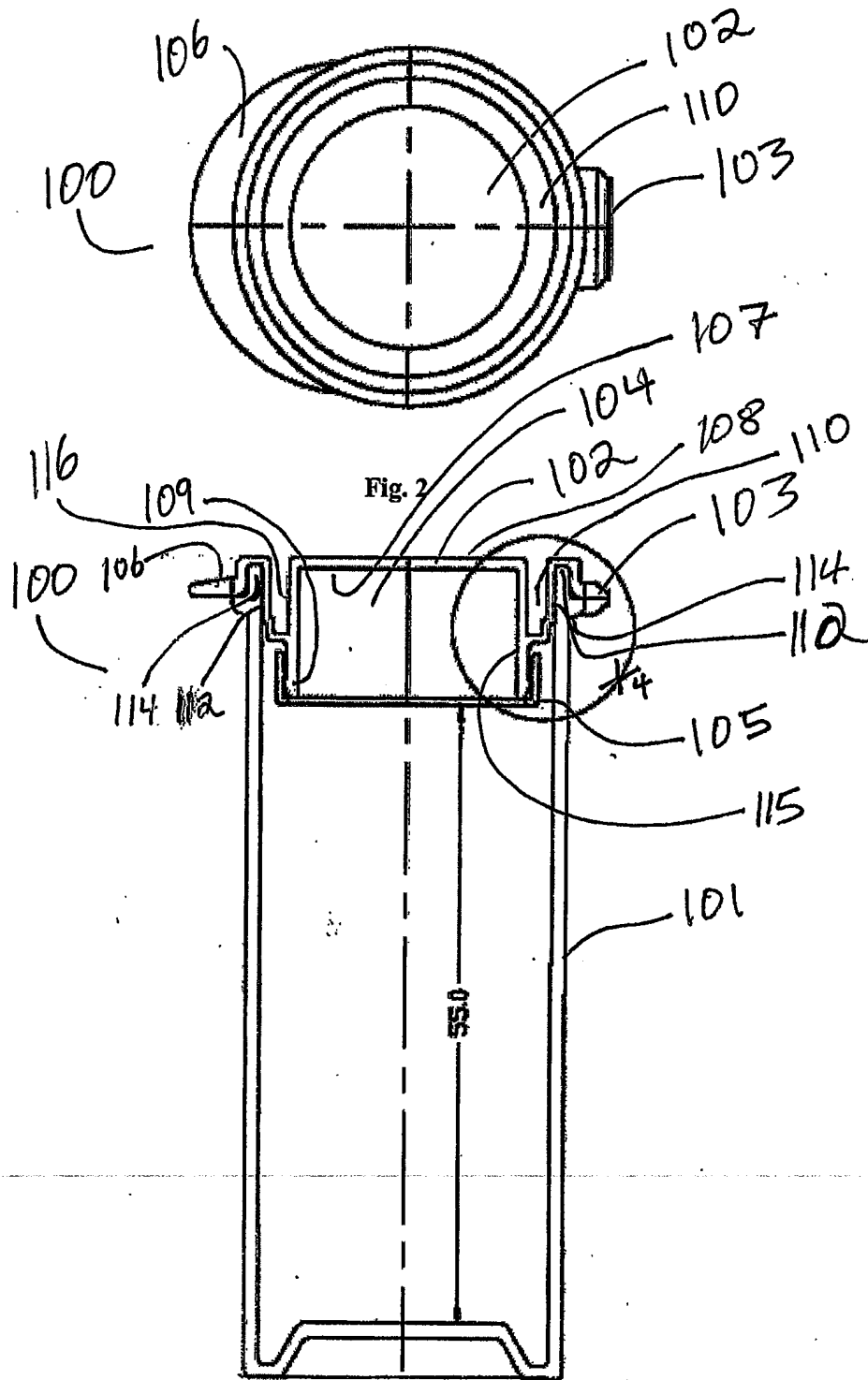
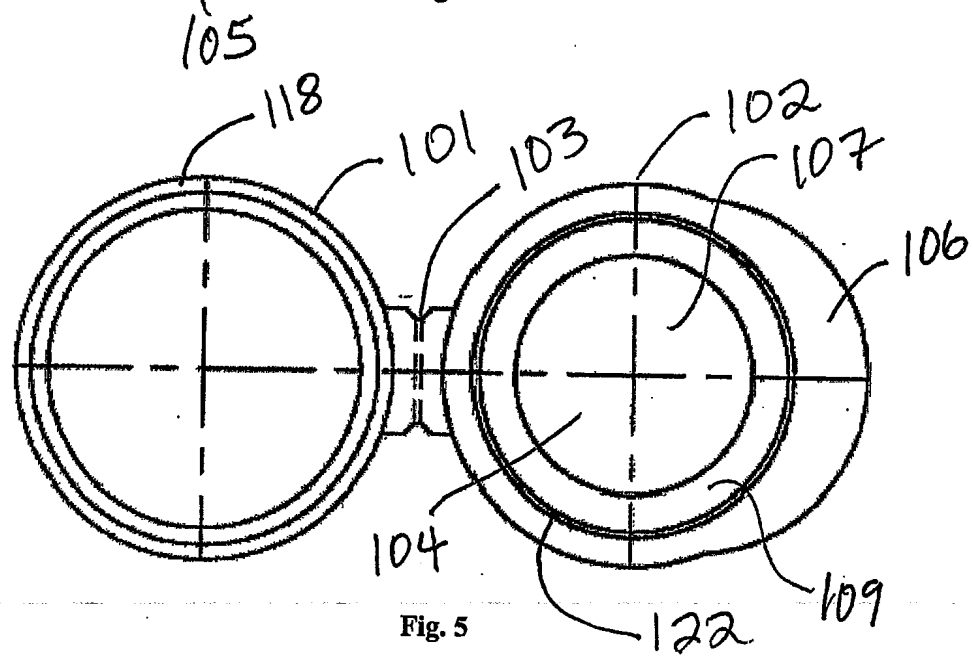
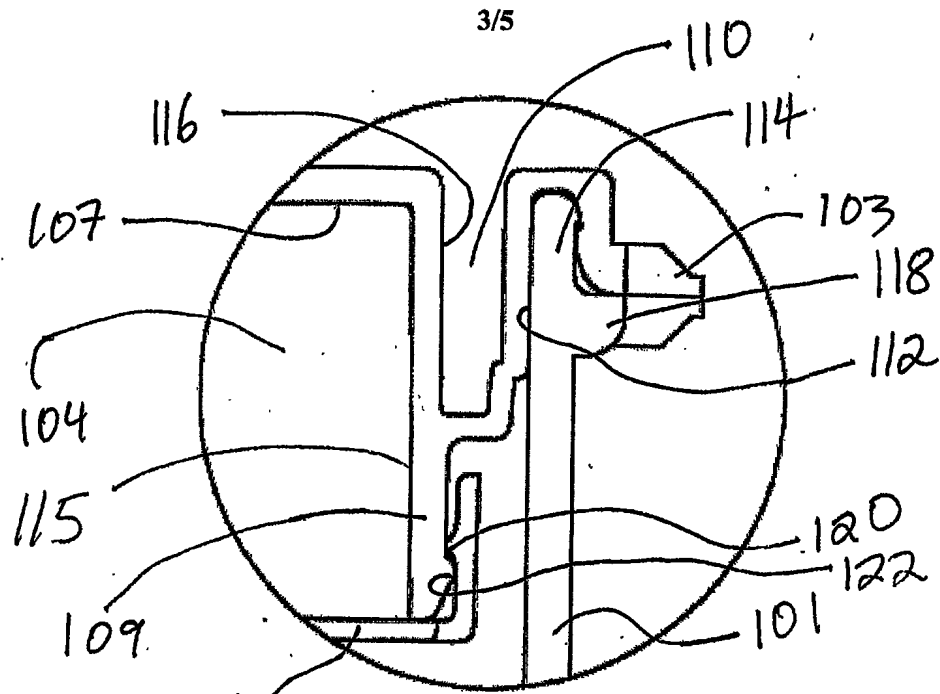
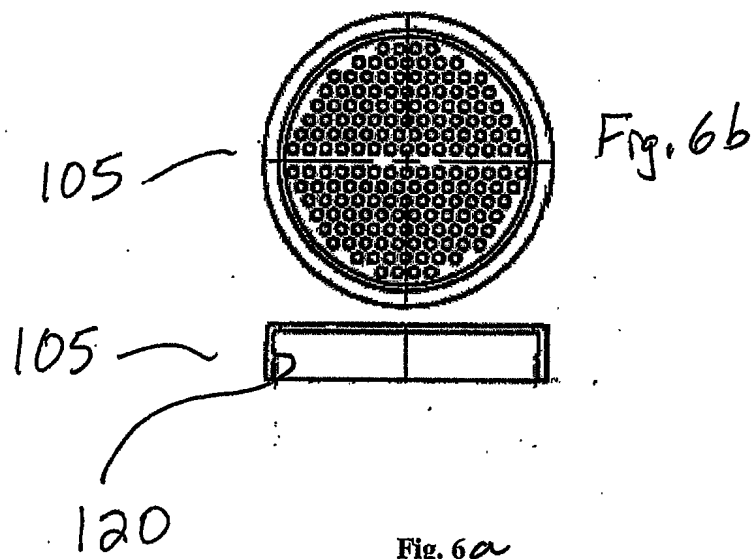


Fig. 3





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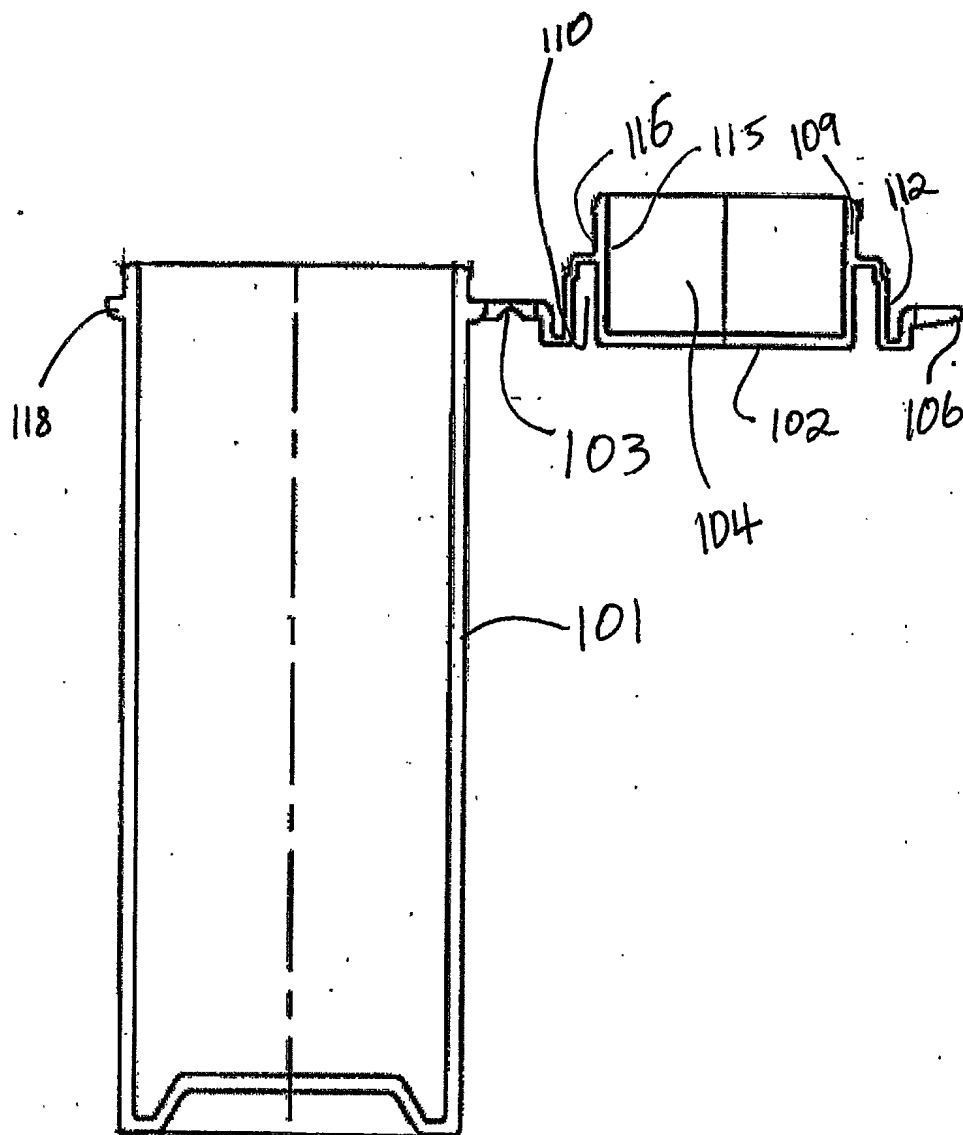


Fig. 7

INTERNATIONAL SEARCH REPORT

Int onal Application No
PCT/IB2004/001335

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D51/30 B65D47/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 992 659 A (KRAJNC JOZEF ET AL) 30 November 1999 (1999-11-30) cited in the application column 3, line 14 - column 5, line 14; figures 1,2	1-20
Y	GB 731 417 A (AVISO AKSJESELSKAP; E & O COLLETT & CO AKSJESELSKA) 8 June 1955 (1955-06-08) page 2, line 18; figures 1,2	1-20
A	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 07, 3 July 2003 (2003-07-03) -& JP 2003 063551 A (SATO KASEI KOGYOSHOKU), 5 March 2003 (2003-03-05) abstract; figures	1-20
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

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Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

In
 national Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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